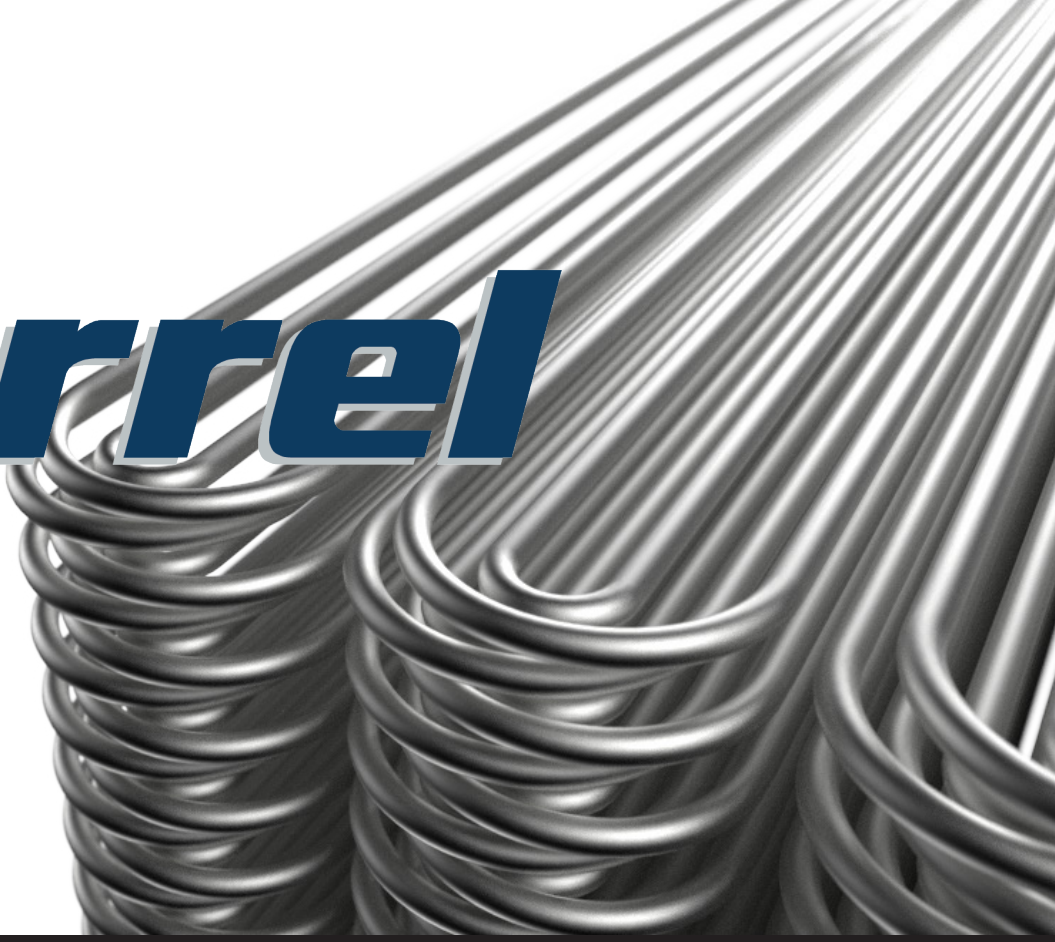
Norrel



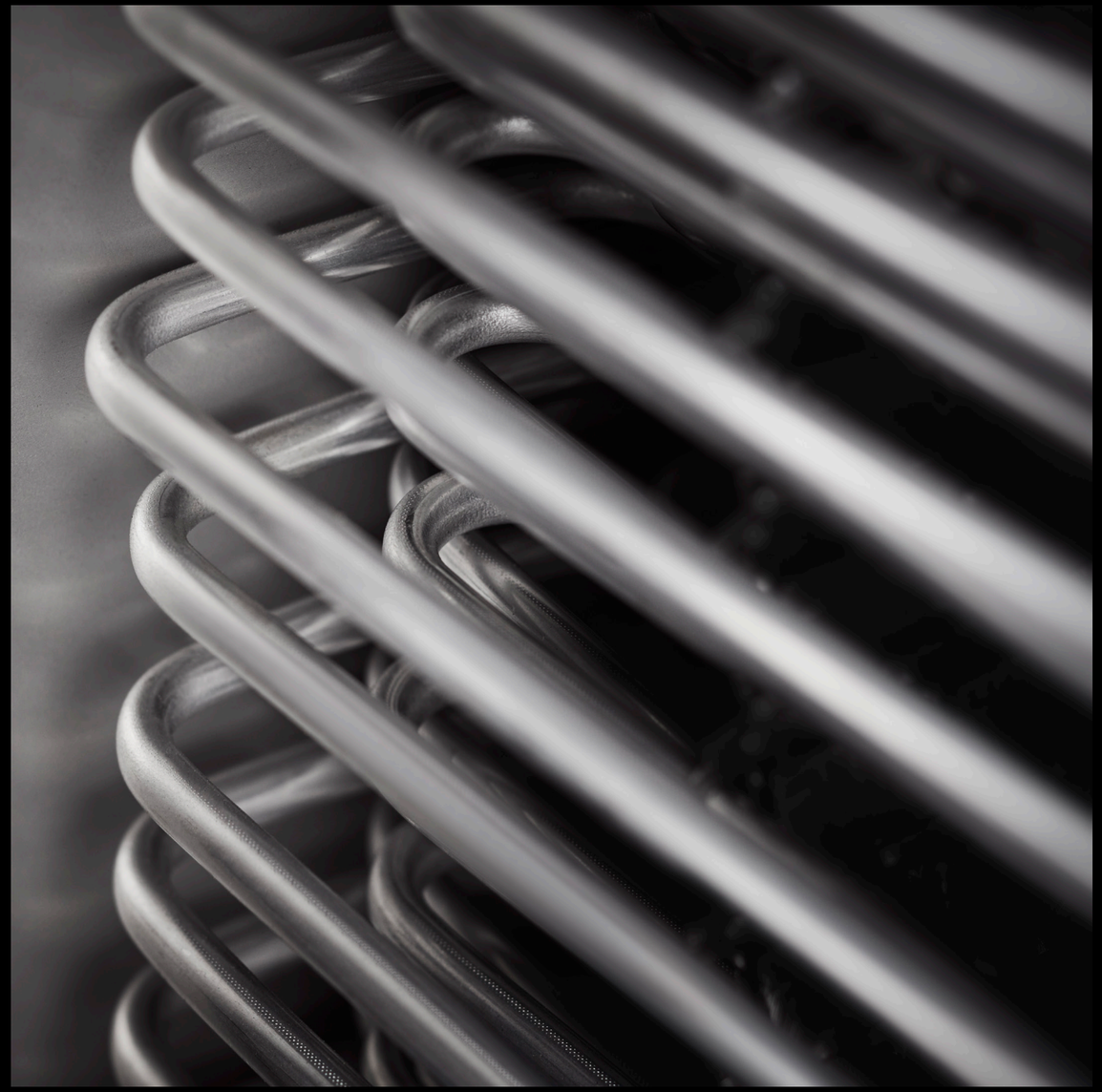
LEPIDO Case Study

Lantmännen

Waste Heat Recovery:
Pancake Factory in Laholm, Sweden

April 4, 2024

Conducted by: Enjay AB, Malmö, Sweden



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“Lepido’s groundbreaking technology delivers up to 90% reduction in heating costs while operating flawlessly in environments where traditional systems fail - proving that sometimes reality exceeds expectations”

Norrel

ENJAY AB - NORREL LLC

LEPIDO - 2 x L50 (1100 x 1800 x 900mm)

Waste Heat Recovery Case Study

Executive Summary

- Type: Production unit for food production Airflow: 9,7 m3/s
- Air temp: 40°C
- Pollutants: Grease, soot & moisture
- Return: 9,7 m3/s supply air to production facility
- Model: 2 x L50 (1100x1800x900 mm)
- Set temperature: +16°C
- Need: 355 kW
- Operating hours: 20 h/day
- Energy need: 616 600 kWh/year
- Lepido Heat exchange effect: 288 kW
- Energy recovery: 614 900 kWh/year

The recovered excess heat in this project covers 99% of the demand for heat in the production facility.

The Project

02.

Background

Industrial food production facilities generate substantial high-temperature airflows during their processes. Traditionally, manufacturers have avoided heat recovery systems due to the significant risk of system clogging, which could result in expensive operational interruptions. However, when successfully implemented, this previously wasted thermal energy can be efficiently redirected to support various facility needs, including ventilation systems, water heating, and other process-specific thermal requirements.

The Challenge

Energy conservation through heat recovery represents a significant opportunity to reduce operational costs and carbon emissions in food manufacturing facilities. However, traditional heat recovery methods have proven prohibitively expensive or technically unfeasible due to the challenging nature of process air containing high levels of particulates, oils, and moisture content. With food and beverage sectors accounting for 16% of total manufacturing output and consuming 12% of industrial energy usage, addressing these technical barriers has become increasingly critical for sustainable operations.

The Subject

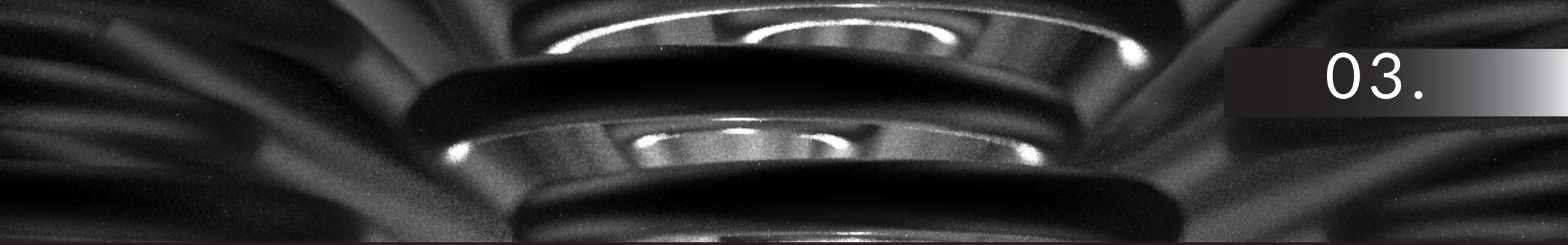
Lantmännen's facility in Laholm, Sweden, stands as one of Europe's premier pancake manufacturing operations, where their intensive production processes generate significant volumes of high-temperature exhaust air. The facility faced a dual challenge: optimizing their operational costs while advancing their sustainability initiatives, particularly in managing their substantial thermal energy discharge, which contained high concentrations of process-related contaminants including grease, soot, and moisture. With their production running 20 hours daily and managing airflow rates of 9.7 m³/s at 40°C, the facility represented a prime opportunity for implementing advanced energy recovery solutions.

The Solution

To address Lantmännen's energy recovery challenges, the innovative Lepido heat exchanger system was implemented as the cornerstone solution. Engineered and manufactured in Sweden, this advanced industrial heat recovery system represents a breakthrough in thermal energy management technology. The system's proprietary design features a sophisticated arrangement of heat exchange coils that enables contaminated process air to flow freely through the system while efficiently capturing thermal energy. Unlike conventional heat exchangers, Lepido's patented configuration prevents the accumulation of particulates, grease, and other contaminants that typically cause system failures in traditional heat recovery units. This revolutionary design allows for consistent operation in demanding industrial environments where standard heat recovery solutions have historically proven ineffective. The installation demonstrated remarkable efficiency, successfully recovering 288 kW of thermal energy and capturing 99% of the available heat from the facility's exhaust airstream, translating to an annual energy recovery of 614,900 kWh.

The Installation

The Lepido installation was strategically integrated into the existing exhaust air system at a critical juncture where the airstream carries a substantial load of industrial contaminants, including concentrated levels of soot and grease particles from the high-volume production line. The system's implementation utilized a sophisticated run-around heat exchange circuit, creating a closed-loop system that effectively transfers recovered thermal energy back to the supply Air Handling Unit (AHU) serving the production area. This engineering approach ensures two critical advantages: complete isolation of the contaminated exhaust stream from the fresh air supply, eliminating any risk of cross-contamination or odor transfer, while simultaneously maintaining the system's optimal performance by preventing particulate accumulation that typically plagues conventional heat exchangers. The installation's design demonstrates remarkable resilience in managing heavily contaminated industrial process air while maintaining consistent heat recovery efficiency.



03.

Project Data

The implementation data presented is derived from a comprehensive industrial installation completed in 2022, where the Lepido system was integrated into a large-scale food production facility. The project demonstrates the system's capability to effectively capture and repurpose thermal energy from contaminated process exhaust, redirecting the recovered heat back into the facility's supply air system. The installation's performance was rigorously monitored through an extensive array of control and measurement equipment, with data accessibility provided to all stakeholders through remote access protocols. The system's effectiveness was evaluated against three critical metrics: validation of energy recovery levels against pre-installation software simulations (within a ±10% tolerance), determination of optimal maintenance intervals, and confirmation of projected economic benefits. Each Lepido unit was specifically configured and optimized using Enjay's proprietary simulation software to meet the unique requirements of the facility's operational parameters.

Lepido - L50 (x2) units installed for waste heat recovery in a food production factory. The data is based off a 2022 project in Laholm, Sweden.

Airflow: 9,7 m3/s
Air temp: 40°C
Pollutants: Grease, soot & moisture
Return: 9,7 m3/s supply air to production facility
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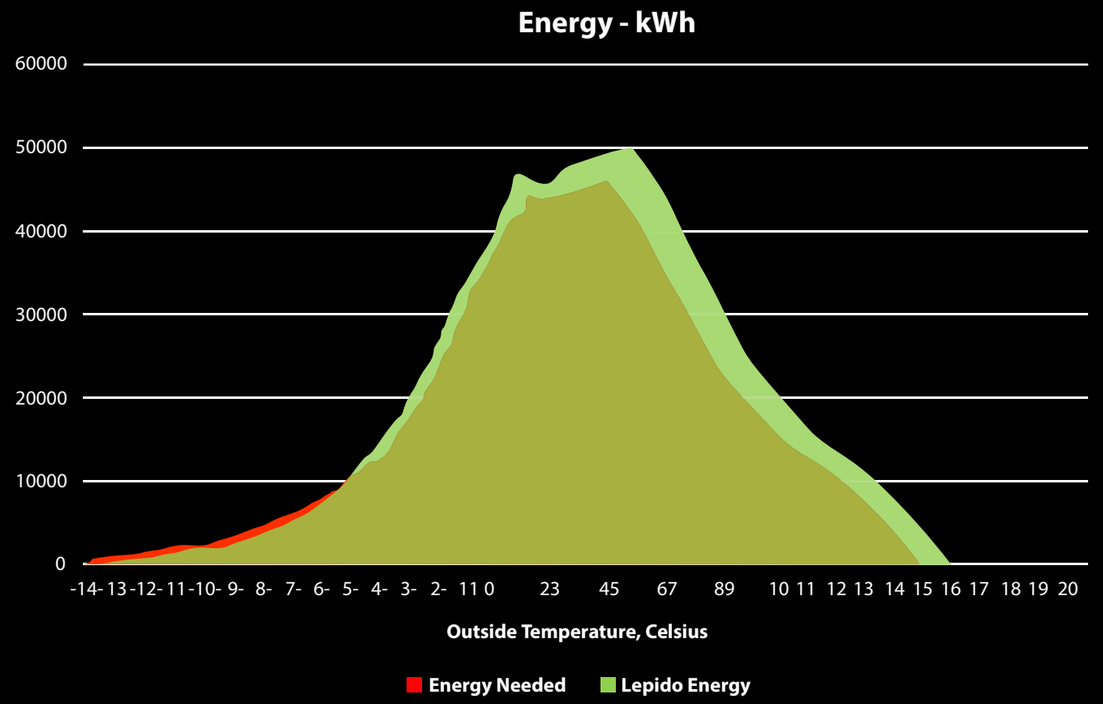
The Results

04.

The implementation of the Lepido system has delivered exceptional performance metrics that validate its effectiveness in industrial heat recovery applications. The system demonstrates remarkable efficiency by recovering 99% of the available thermal energy from the process exhaust, generating substantial annual energy savings of 614,900 kWh. This high-performance recovery rate significantly reduces the facility's reliance on primary energy sources for heating requirements.

The project's success was further enhanced by the system's innovative design characteristics, which allowed for strategic decentralization from the primary mechanical room. This architectural advantage eliminated the need for extensive ductwork and piping infrastructure, resulting in substantial reductions in both installation complexity and associated costs. Furthermore, the strategic positioning of the Lepido units in close proximity to the production lines has optimized maintenance accessibility, streamlining service procedures and minimizing associated operational expenses. The system's performance is continuously monitored through comprehensive data collection and analysis protocols, ensuring sustained operational efficiency and enabling proactive maintenance scheduling.

Lepido Heat Recovery Performance: 99% Energy Recovery Rate | 614,900 kWh Annual Savings



Lepido Waste Heat Recovery System

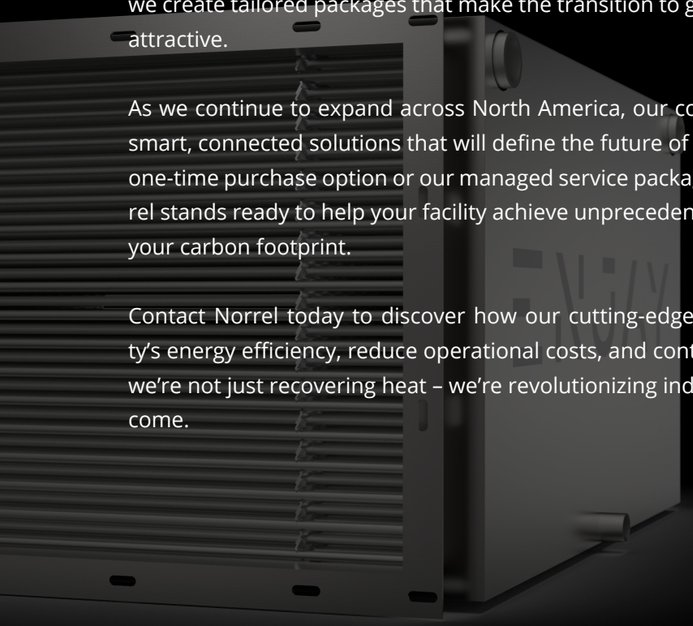
05.

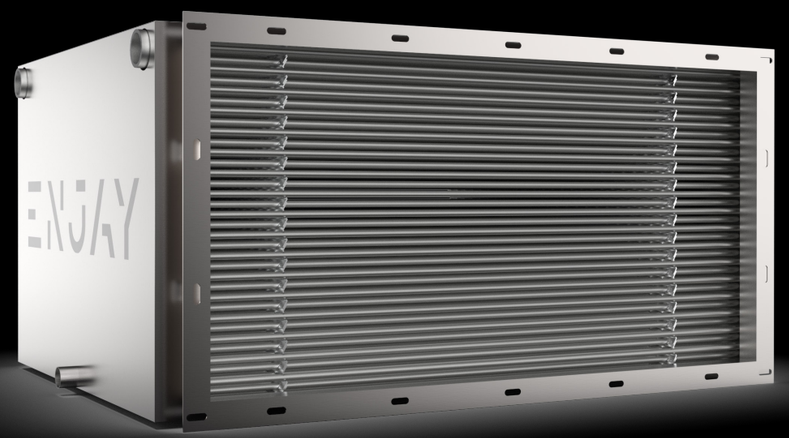
The Lepido technology represents a paradigm shift in industrial heat recovery, demonstrating that sustainable solutions can thrive in even the most challenging environments. This Swedish-engineered marvel stands as a testament to innovative design, where its unique geometry and fin-less construction work in harmony with natural forces rather than against them. Unlike conventional heat exchangers that struggle with contaminated airstreams, Lepido's revolutionary design eliminates the need for pre-filtration while maintaining exceptional performance.

Norrel, as the exclusive North American provider of this groundbreaking technology, offers comprehensive solutions that extend beyond mere equipment installation. Through our Free Energy Sustainability Audit and expertise in securing sustainable funding grants, tax benefits, and government incentives, we create tailored packages that make the transition to green technology both seamless and financially attractive.

As we continue to expand across North America, our commitment to innovation drives us to develop smart, connected solutions that will define the future of industrial heat recovery. Whether through our one-time purchase option or our managed service package with real-time monitoring and support, Norrel stands ready to help your facility achieve unprecedented energy savings while significantly reducing your carbon footprint.

Contact Norrel today to discover how our cutting-edge Lepido technology can transform your facility's energy efficiency, reduce operational costs, and contribute to a more sustainable future. Together, we're not just recovering heat – we're revolutionizing industrial energy management for generations to come.





Contact Us

For a personalized consultation on how Lepido’s revolutionary heat recovery technology can transform your facility’s energy efficiency, or to schedule your Free Energy Sustainability Audit, contact Norrel’s dedicated sustainability team:

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